

Detailed plans for building the Launch Device

Tools Required:

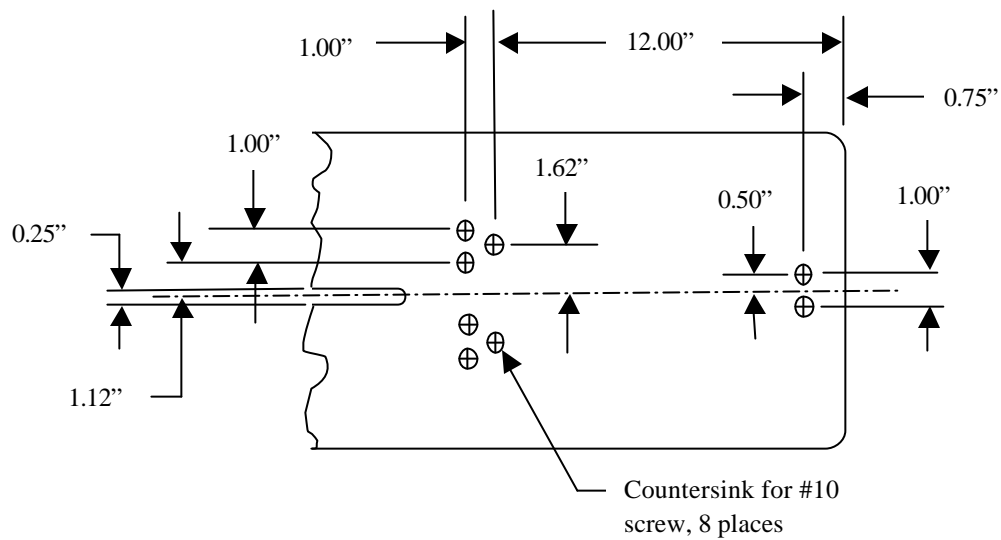
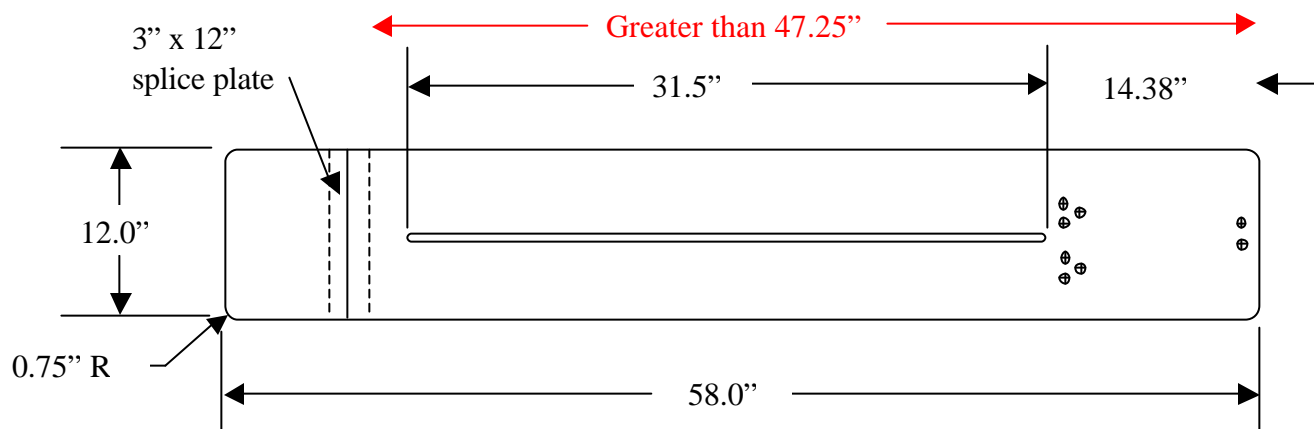
Table saw or other machine for cutting straight edges
Screwdriver
Drill with various drill bits
Square or triangle for aligning
Sanding disc or sandpaper
Pencil
Straight edge
Paste wax with applicator

Materials required:

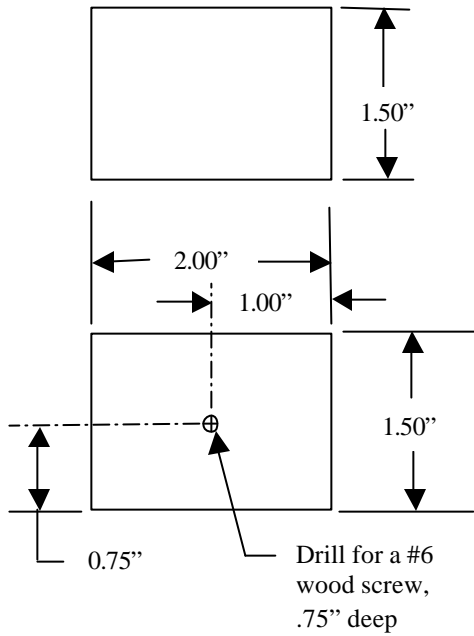
- 8 #10 countersunk wood screws, 1.25 inches long
- A/R Wood glue, as required
- 1 10d box nail (for locking pin)
- 1 ½" x ½" x 6' pine trim (make from excess from the 1" x 6" board)
- 1 2" x 2" x 6' pine (actually 1½" x 1½" square)
- 1 ¼" composite board, 2' x 4' or 2' x 6' (preferred)
- 2 1" x 6" x 6' pine board, or ¾" plywood 2' x 8'
- 1 1" x 3" x 1' red oak board (actually ¾" thick)
- 1 2" x 4" x 1' stud (actually 1½" x 3½")
- 1 Extension spring (11" long, 1" outer diameter, 0.062" wire; McMaster-Carr Part Number 9640K243)
- 2 #6 screw eyes, 1/8" inner diameter, ¾" long with wood screw threads
- 1 L-hook (McMaster-Carr Part Number 9594T14)
- 1 Hard rubber sheet, ¼" x 1½" x 4" (McMaster-Carr Part Number 9455K15)

Yellow indicates parts that are included in a kit available from Paul MacNeal for \$8.00. The price includes the cost of the parts, tax, and FedEx shipping charges. Subtract \$4.00 if picked up in person.

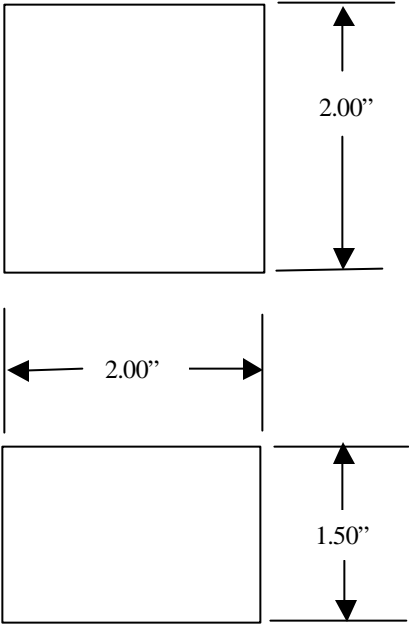
Item	Description	Material
1	Launch ramp, 12" x 58" with slot	¼" composite board
2	Spring anchor block	2" x 4" pine
3A, 3B	Bumper stop block	2" x 4" pine
4A, 4B	Rubber pad	¼" rubber pad
5	Glide block	1" x 3" red oak board
6A, 6B	Side glide rails	¼" composite board
7	Closeout plate	¼" composite board
8A, 8B	Rail reinforcement	½" x ½" trim
9A, 9B	Launch ramp stiffeners	1" x 6" board or ¾" plywood
10A, 10B	Front support legs	2" x 2" pine
11A, 11B	Rear support legs	2" x 2" pine
12A, 12B	Anchor block gussets	¼" composite board



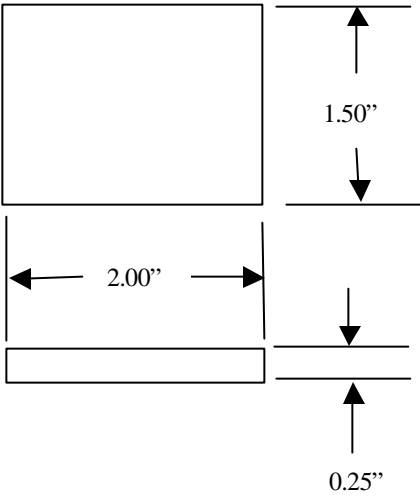
Item 1



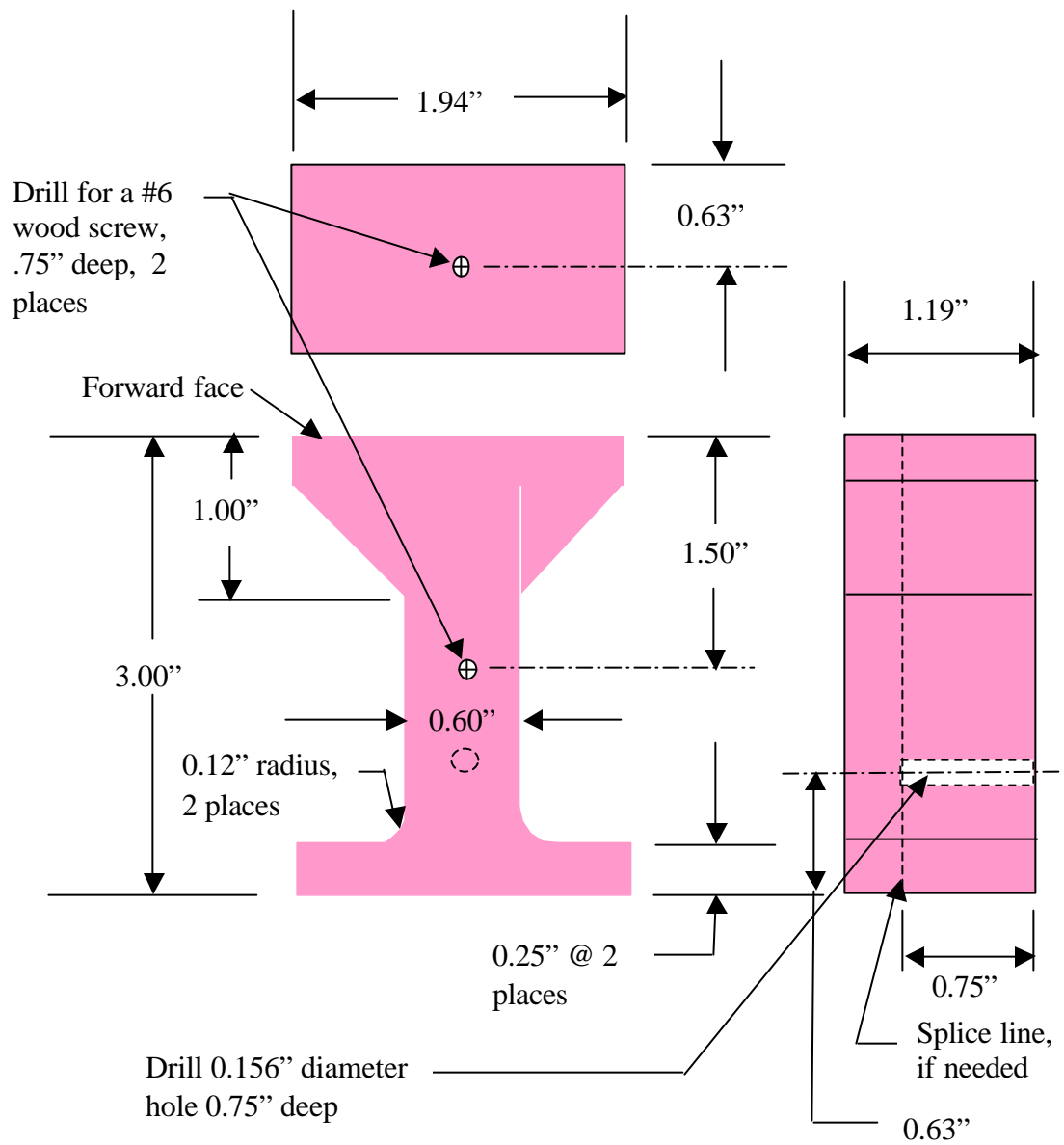
Item 2



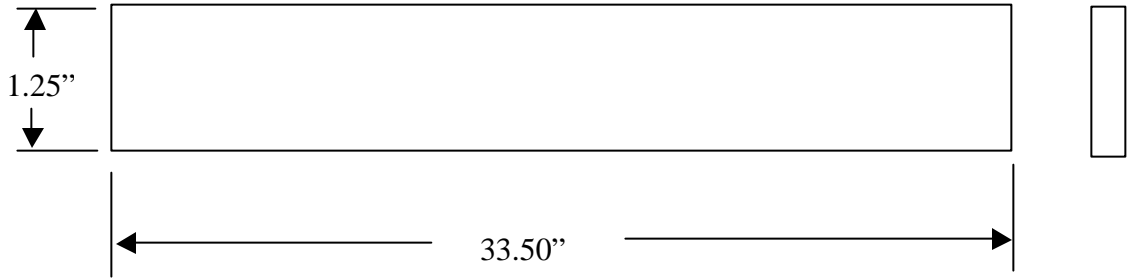
Item 3A, 3B



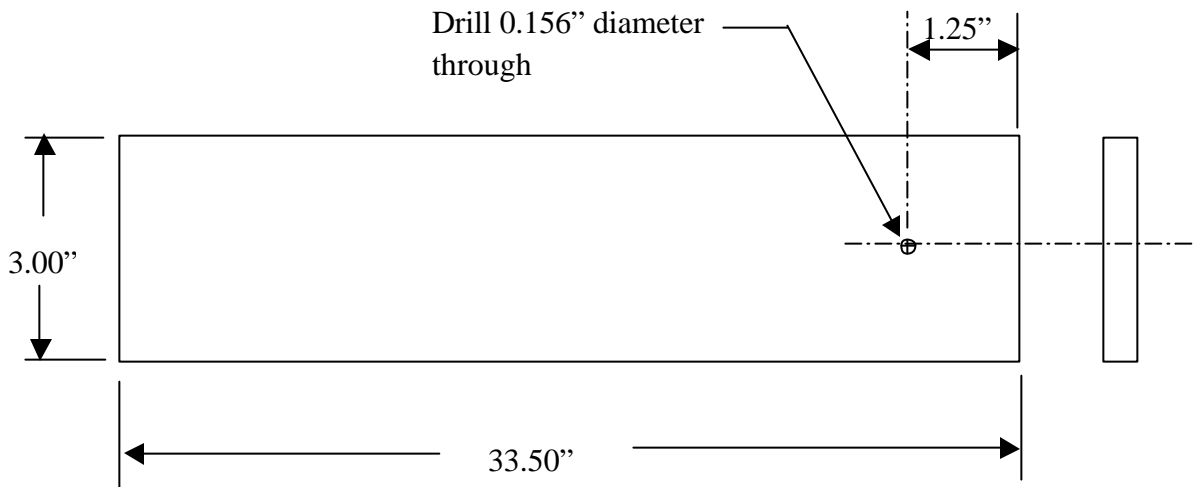
Item 4A, 4B



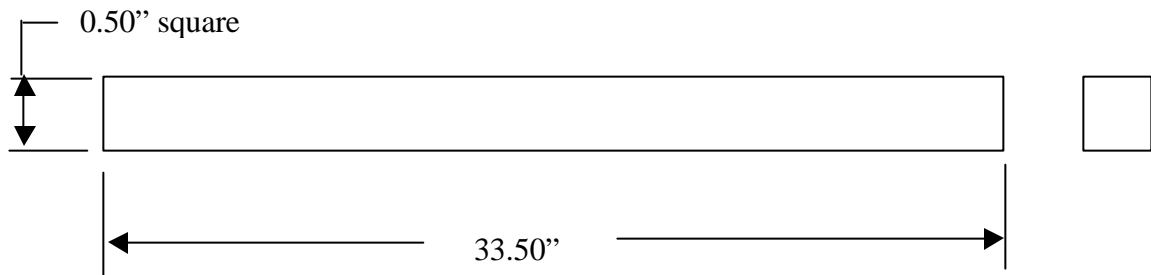
Item 5



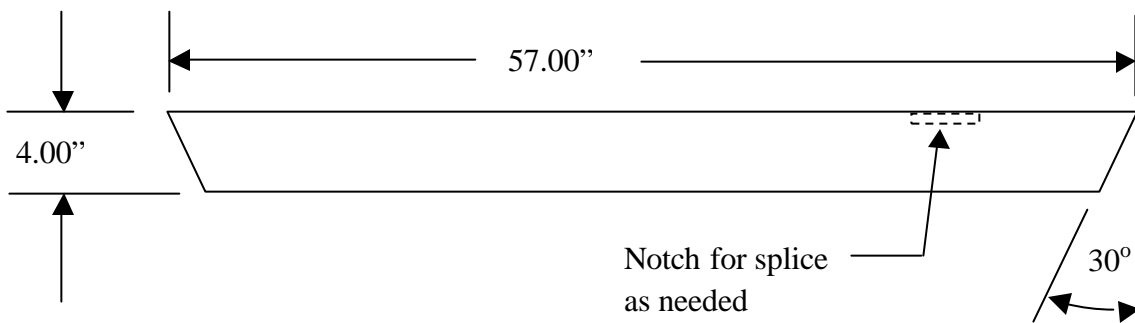
Item 6A, 6B



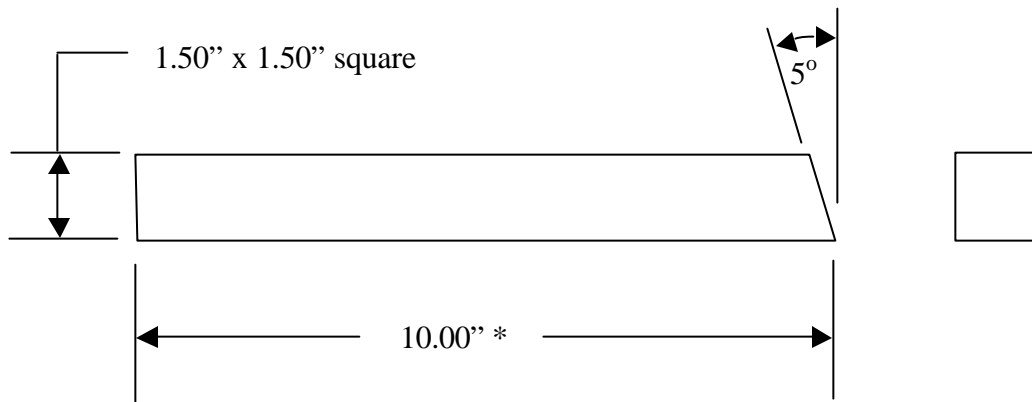
Item 7



Item 8A, 8B

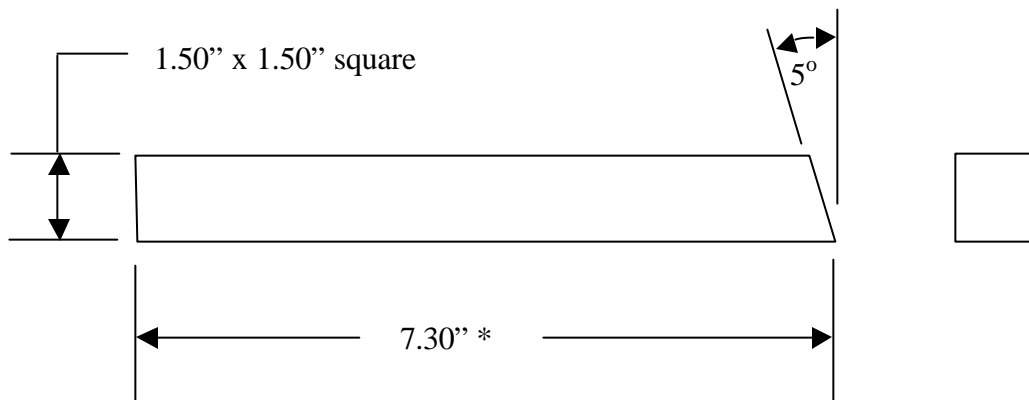


Item 9A, 9B



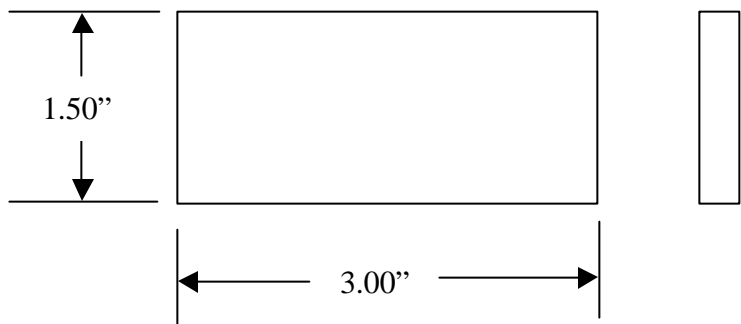
* Length depends on table height and height of launch area relative to target area. Adjust as necessary to ensure proper height of "hook" above target.

Item 10A, 10B



* Length depends on table height and height of launch area relative to target area. Adjust as necessary to ensure proper height of "hook" above target.

Item 11A, 11B



Item 12A, 12B

Assembly Instructions for the Launch Device

Assembly of the launch device will take many hours. Time will be required to allow for glue to dry in many steps. Patience will be a great asset. The photographs at the end of the instructions may be helpful.

Step 1: Bond splice plate (see descriptive figure of Item 1) to both parts of the launch ramp (if necessary) using a good quality wood glue and allow to dry. If the launch ramp is already one piece, this step is not needed. Whenever an instruction calls out a bond, this implies the use of a good quality wood glue.

Step 2: Turn the platform up-side down and draw two lines running along the entire length of the platform separated by exactly 2.00". Each line should be exactly 1.00" from the centerline of the launch platform. Draw another line perpendicular to both of these lines exactly 13.75" from the front edge of the platform.

Step 3: Bond the side glide rails [Items 6A and 6B] to the launch ramp [Item 1]. Be careful to align the inside edge of Items 6A and 6B along the entire line drawn in Step 2. Ensure that the top edges of Items 6A and 6B are also 2.00" apart. Adjust as necessary. Ensure that the edges closest to the front of the launch platform are 13.75" away from the front. Once the glue has begun to partially set, carefully scrap off any excess glue on the inside edges of the bond joint (a sharp inside corner is necessary for proper action of the glide block).

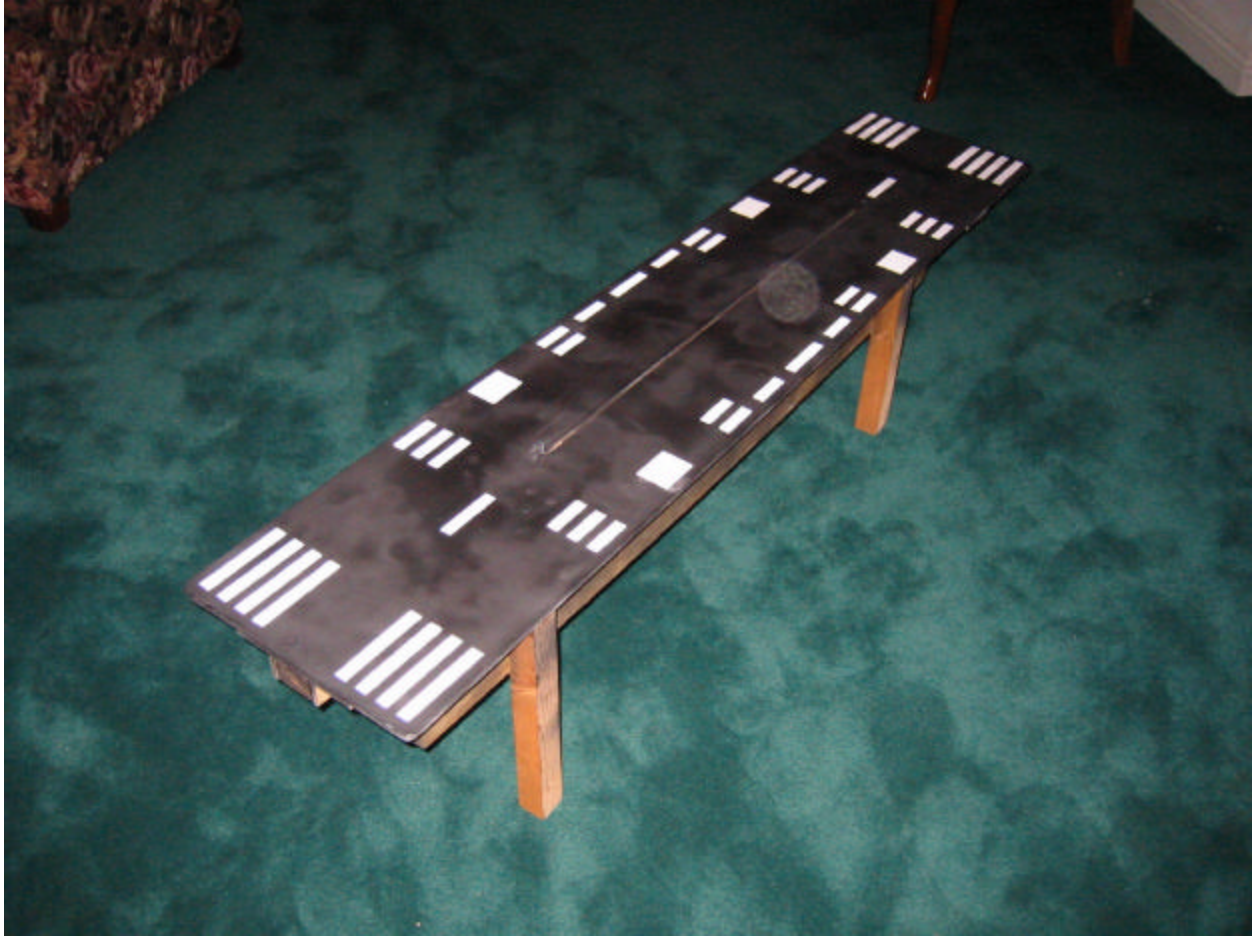
Step 4: An optional light coating of wax may be applied, but this step must be done very carefully. Prior to applying wax to the inside surfaces of Items 1, 6A, and 6B, carefully mask off the exposed top edge of Items 6A and 6B to prevent accidental application of wax. Apply and wipe off a light wax coat to the inside surfaces of Items 1, 6A, and 6B.

Step 5: An optional light coating of wax may be applied to the closeout plate [Item 7] prior to bonding (see Step 6). Carefully mask two surface strips on Item 7 0.63" wide leaving approximately 1.75" of exposed surface down the middle. Apply and wipe off a light wax coat to this exposed surface of Item 7.

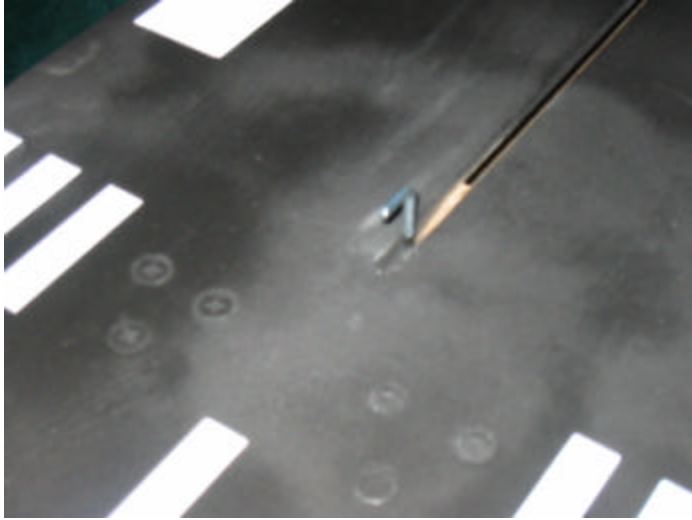
Step 6: **CAUTION!! Before bonding the closeout plate [Item 7], make sure that the glide block [Item 5] can easily be placed into the opening near the back end of the launch ramp. This is especially a concern if a splice plate (see Step 1) has been utilized in the vicinity of the opening near the rear of the platform. If the glide block will not fit after the closeout plate is installed, then you must perform Steps 13, 14, and 15 prior to proceeding with this Step.** Bond the closeout plate [Item 7] to the edges of the side glide rails [Items 6A and 6B]. Be careful to apply a uniform thin surface of glue to the edges of Item 6A and 6B. To minimize the chances for creating an unacceptable amount of glue on the inside corner, carefully remove glue from the top, inside edges of Items 6A and 6B while still leaving glue on the outside, top edges of Items 6A and 6B. Firmly fix Item 7 on top of the glued edges of Items 6A and 6B. Make sure that Item 7 is centered on the slot of Item 1. Note that the hole in Item 7 is located approximately 46.0" from the front edge.

- Step 7: Bond a rail reinforcement [Item 8A] to two surfaces formed by the intersection of the side glide rail [Item 6A] and the launch ramp [Item 1]. Bond the other rail reinforcement [Item 8B] to two surfaces formed by the intersection of Item 6B and Item 1.
- Step 8: Bond the rubber pads to the bumper stop blocks. [Item 4A to 3B and Item 4B to 3B]. Allow to dry.
- Step 9: Carefully locate bumper stop assemblies [Item 4A/3A and Item 4B/3B] adjacent to the glide block housing [Items 6A/6B/7] with the rubber pads touching the glide block housing. Bond the bumper stop assemblies to the launch ramp [Item 1]. Make sure that the wood blocks are 1.31" apart.
- Step 10: Install a brass screw eye into the predrilled hole in the spring anchor block [Item 2]. Make sure that the center of the hole of the screw eye is 3/8" from the face of the block.
- Step 11: Bond the spring anchor block [Item 2] to the launch ramp [Item 1]. Make sure that Item 2 is located along the center of Item 1 and the front edge of Item 2 is aligned to the front edge of Item 1.
- Step 12: Bond the anchor block gussets [Items 12A and 12B] to the surfaces of the spring anchor block [Item 2] and the launch ramp [Item 1]. Ensure that Items 12A and 12B are parallel to the center slot of the launch ramp.
- Step 13: Apply and wipe off a thin coating of wax to all surfaces of the glide block [Item 5].
- Step 14: Install a brass screw eye into the forward face of the glide block [Item 5]. The 0.156" diameter hole is on the bottom face near the rear. Make sure that the center of the hole of the screw eye is 3/8" from the face of the wood block.
- Step 15: Place the glide block [Item 5] into the cavity formed in Steps 3 and 6. Make sure the screw eye is facing forward.
- Step 16: Install the L-hook into the top face of the glide block [Item 5]. Make sure that the L-hook is facing forward and make sure that the bottom of the hook is located between 0.75" and 0.80" above the surface of the launch ramp [Item 1].
- Step 17: Drill eight pilot holes for #10 countersunk wood screws into the two bumper block assemblies [Items 3A/4A and 3B/4B] and the spring anchor block [Item 2]. Install the eight #10 wood screws through the launch ramp [Item 1] into the block assemblies.
- Step 18: Install the spring onto both screw eyes. It may be necessary to deform the ends of the spring in order to hook the spring onto the screw eyes. Make sure that the ends of the spring are bent back to their original locations after they are hooked onto the screw eyes.

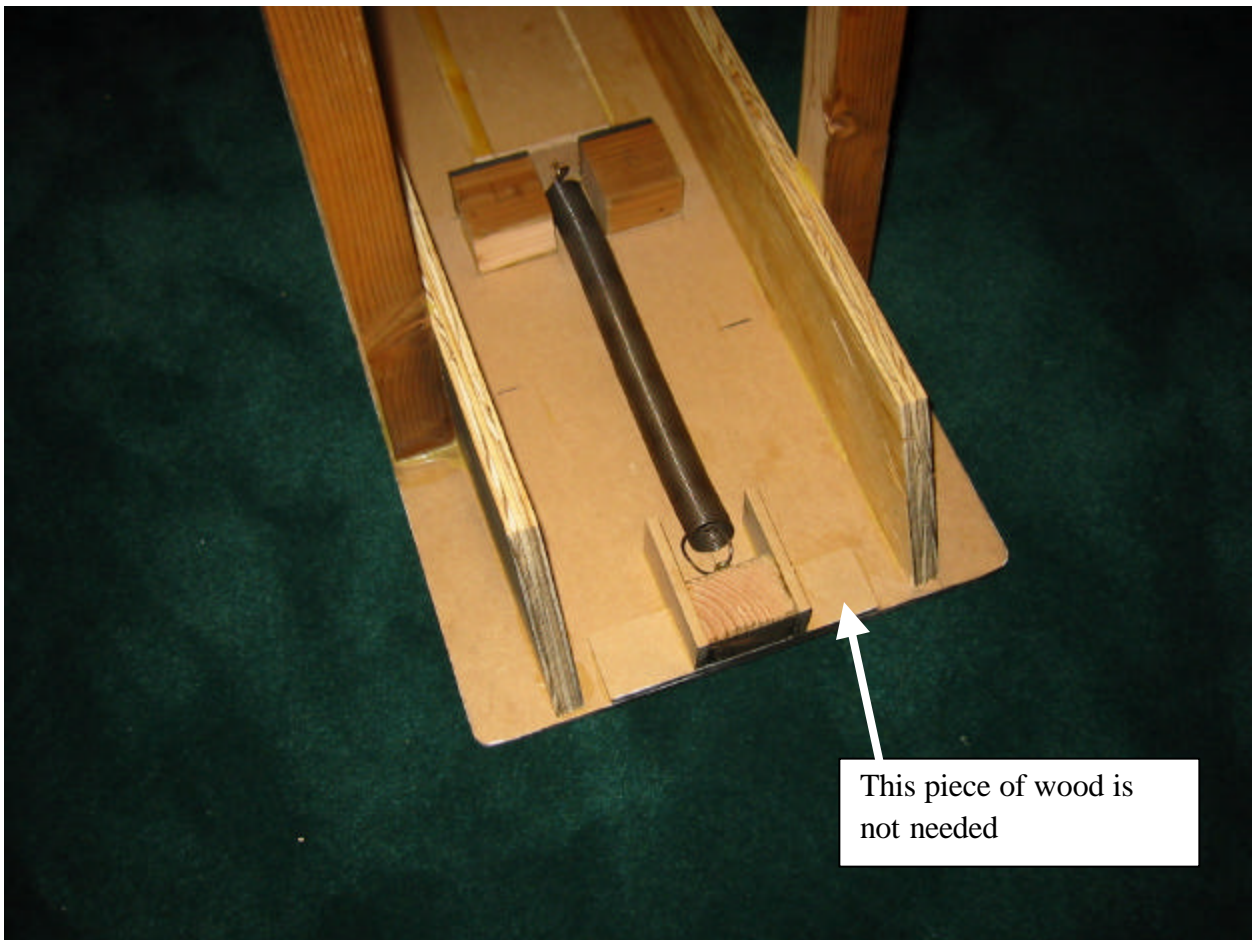
- Step 19: Bond the launch ramp stiffeners [Items 9A and 9B] to the launch ramp [Item 1]. Make sure that the stiffeners are located parallel to the length of the ramp and are located 1.75" inward from each edge. Allow to dry.
- Step 20: Bond the front support leg [Item 10A] to the surfaces of the launch ramp stiffener [Item 9A] and the launch ramp [Item 1]. Locate the front edge of Item 10A 7.00" from the front edge of the launch ramp.
- Step 21: Bond the front support leg [Item 10B] to the surfaces of the launch ramp stiffener [Items 9B] and launch ramp [Item 1]. Locate the front edge of Item 10B 7.00" from the front edge of the launch ramp.
- Step 22: Bond the rear support leg [Item 11A] to the surfaces of the launch ramp stiffener [Item 9A] and the launch ramp [Item 1]. Locate the front edge of Item 11A 39.12" from the front edge of the launch ramp.
- Step 23: Bond the rear support leg [Item 11B] to the surfaces of the launch ramp stiffener [Item 9B] and the launch ramp [Item 1]. Locate the front edge of Item 11B 39.12" from the front edge of the launch ramp.
- Step 24: Paint the completed launcher as desired.



Completed Launch Device



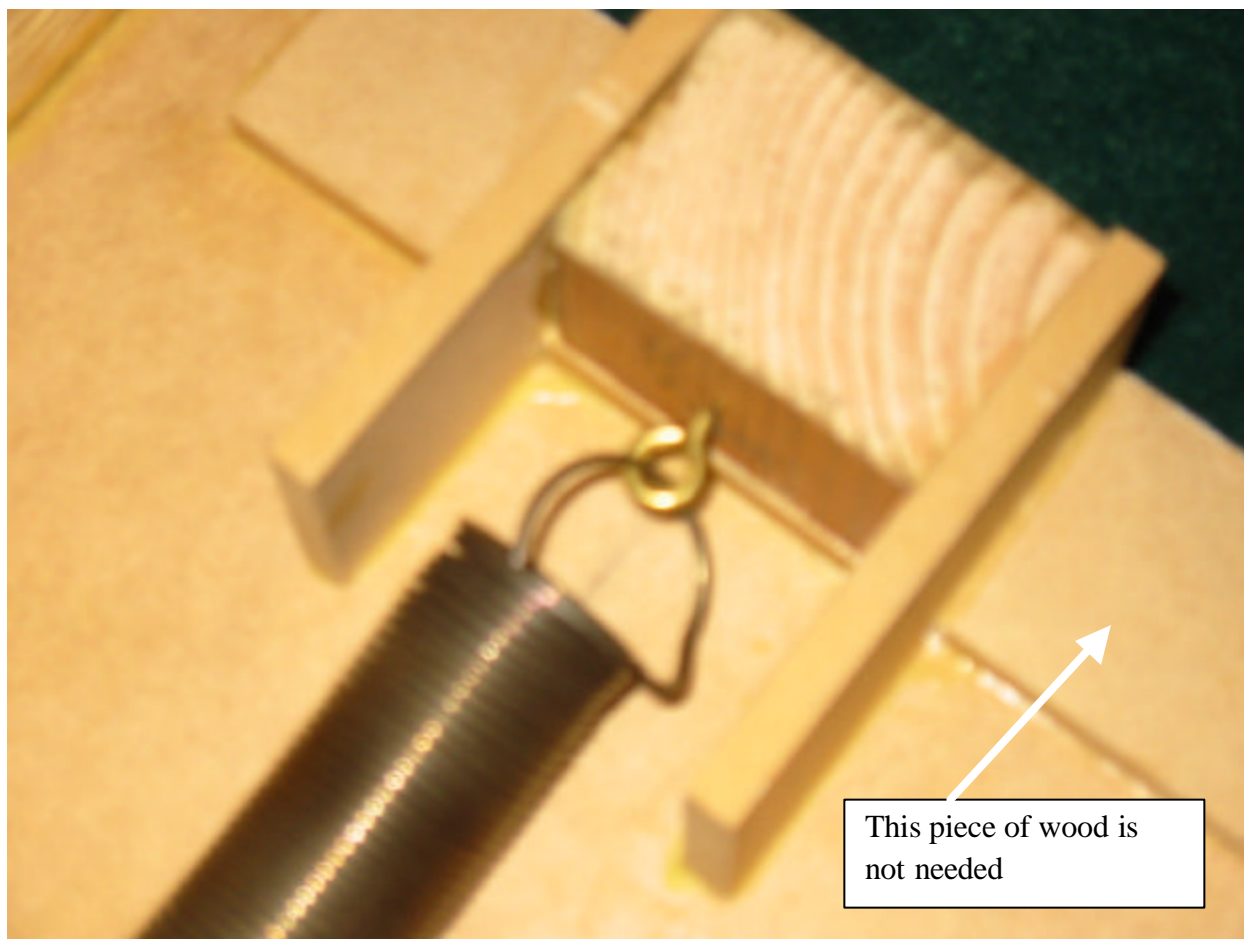
Detail showing Launch Hook



Detail of Installed Spring



Detail of Bumper Block and Spring



Detail of Spring Anchor Block (out of focus...Oops!)



Detail showing rear of Launch Device

Note: The Launch ramp stiffeners [Items 9A and 9B] should extend to the end of the ramp and the splice plate for Item 1 should not have any notches. Also, the closeout plate [Item 7] should only have one hole.